

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO FLUID CONTROL VALVE ARRANGEMENTS

(71) We, ENGLISH ELECTRIC VALVE COMPANY LIMITED, a British company, of 106, Waterhouse Lane, Chelmsford, Essex CM1 2QU, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to fluid control valves and in particular to such valves for controlling the flow of a gas.

A common form of fluid control valve as at present known consists of a tapered needle movable in a seat. One defect of such known arrangements is that the abrasive action of the needle moving in the seat can result in particulate contamination of the fluid stream. Furthermore, the shut-off action can become unreliable after a period of use.

The present invention seeks to provide an improved fluid control valve in which the above difficulties are reduced.

25 According to this invention a fluid control valve comprises a body having a port emerging at a surface of said body and said surface having a groove therein of reducing cross-sectional area along its length and communicating with said port, the port and the groove for at least part of its length being covered by a sheet of flexible material and means being provided for raising the end of said sheet remote from said port so as to expose a cross-sectional area of said groove which increases as the end of said sheet is raised.

Normally the larger end of said groove communicates with said port.

40 The valve may comprise one port only if, for example, it is to be used as a controllable exhaust valve. More commonly, however, a further port is provided to extend through said body which port emerges into a sealed chamber which also contains said first mentioned port, said surface and said sheet of flexible material.

Normally said sheet does not extend to cover said further port. It may so extend however, if so desired. Normally said surface is highly polished. Suitable materials for the body include stainless steel, whilst said sheet of flexible material may be rubber, preferably of the kind commercially available under the Registered Trade Mark "Viton".

The width and/or the depth of said groove may be variable along its length.

In one embodiment of the present invention said sheet of flexible material is attached to a spring blade which tends to raise said sheet away from said groove, means being provided for controlling the extent to which said spring blade is effective in raising said flexible sheet.

Said last mentioned means may be an adjustment screw or a lever mechanism or comprise a diaphragm.

In another embodiment of the invention, said end of said sheet is attached to means, for example a roller or sliding block, arranged to move along said groove to roll up said sheet.

The invention is illustrated in and further described with reference to the drawings accompanying the provisional specification in which,

Figures 1a and 1b are provided schematically to illustrate a gas control valve in accordance with the present invention and

Figures 2a and 2b are respectively exploded and sectional views of a typical practical gas control valve in accordance with the present invention.

Referring to Figures 1a and 1b, a plate 1 of stainless steel, the upper surface 2 of which has been highly polished is provided with two ports 3 and 4, extending through the plate 1 to emerge at the surface 2.

Extending from the opening of port 4 in surface 2 towards the port 3 is a groove 5, the width and depth of which reduces along its length in tapered fashion from a

maximum cross-sectional area adjacent the port 4 to a minimum cross-sectional area towards the port 3. Provided to cover the opening of port 4 in surface 2 and the groove 5 is a sheet of rubber 6 of the kind commercially available under the Registered Trade Mark "Viton". It will be noted that the rubber sheet 6 does not extend so far as to cover port 3 although in some embodiments it may do so. An enclosure 7 forms a gas tight chamber within which are the openings of ports 3 and 4 in surface 2 and the sheet 6.

The depth, width and length of the groove 5 determines the rate of flow of gas entering port 4. As the sheet 6 is gradually raised at its end nearer port 3, gas will be admitted into port 4 from a gas supply connected to port 3. As the sheet 6 is lifted further the rate at which gas enters port 4 increases due to the increasing size of the aperture constituted by groove 5, through which the gas passes.

In Figures 1a and 1b no attempt has been made to illustrate any particular method of raising the end of the sheet 6. In practice, away from the groove 5. Extending through this may take a number of different forms one of which may be seen in Figures 2a and 2b. In this case the rubber sheet 6 is attached to a spring blade 8 which is biased such as to lift the rubber sheet 6 up and the top of the enclosure 8 is an adjusting screw 9 having a fine micrometer thread. The screw 9 is sealed against leakage by means of an "O" ring 10. The end of the spring blade 8 remote from the port 3 is clamped to the plate 1 by means of a clamping member 11.

As the screw 9 is turned down so it presses the rubber sheet 6 over the groove 5 eventually sealing the same totally. As screw 9 releases so the spring blade 8 tends to restore to expose an increasing aperture for gas passing between ports 3 and 4.

In other embodiments of the invention the screw 9 is replaced by a lever mechanism or is replaced by a diaphragm whilst in other embodiments instead of a spring blade 8 the end of the sheet 6 is attached to a roller or sliding block which is moved back along the groove to roll up the sheet 6 thus exposing an increasing aperture for gas passing into port 4.

WHAT WE CLAIM IS:—

1. A fluid control valve comprising a body having a port emerging at a surface of said body and said surface having a groove therein of reducing cross-sectional area along its length and communicating with said port, the port and the groove for at least part of its length being covered by a sheet of flexible material and means being provided for raising the end of said sheet remote from said port so as to expose a

cross-sectional area of said groove which increases as the end of said sheet is raised.

2. A valve as claimed in claim 1 and wherein the larger end of said groove communicates with said port.

3. A valve as claimed in claim 1 or 2 and comprising one port only for use as a controllable exhaust valve arrangement.

4. A valve as claimed in claim 1 or 2 and wherein a further port is provided to extend through said body which port emerges into a sealed chamber which also contains said first mentioned port, said surface and said sheet of flexible material.

5. A valve as claimed in any of the above claims and wherein said surface is highly polished.

6. A valve as claimed in any of the above claims and wherein said body is of stainless steel.

7. A valve as claimed in any of the above claims and wherein said sheet of flexible material is of rubber.

8. A valve as claimed in any of the above claims and wherein said sheet of flexible material is attached to a spring blade which tends to raise said sheet away from said groove, means being provided for controlling the extent to which said spring blade is effective in raising said flexible sheet.

9. A valve as claimed in claim 8 and wherein said last mentioned means is an adjustment screw.

10. A valve as claimed in claim 8 and wherein said last mentioned means is a lever mechanism.

11. A valve as claimed in claim 8 and wherein said last mentioned means comprises a diaphragm.

12. A valve as claimed in any of claims 1 to 7 and wherein said end of said sheet is attached to means arranged to move along said groove to roll up said sheet.

13. A valve as claimed in claim 12 and wherein said last mentioned means comprises a roller.

14. A valve as claimed in claim 13 and wherein said last mentioned means comprises a sliding block.

15. A gas control valve substantially as herein described and illustrated in Figures 1a and 1b of the drawings accompanying the provisional specification.

16. A gas control valve substantially as herein described and illustrated in Figures 2a and 2b of the drawings accompanying the provisional specification.

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